Energy-Efficient Optical Signal Processing Using Optical Time Lenses - DTU Orbit (08/11/2017)

Energy-Efficient Optical Signal Processing Using Optical Time Lenses: Data Communication and Storage Applications

This chapter describes advanced functionalities for optical signal processing using optical time lenses. A special focus is devoted to functionalities that allow for energy-savings. In particular, we find that optical signal processing, where the processing is broadband and capable of handling many bits in a single operation allows for sharing the processing energy by the many bits, and hence the energy per bit is reduced. Such functionalities include serial-to-parallel conversion in a single time lens, where a large number of parallel demultiplexers may be substituted by a single time lens. Combining time lenses into telescopic arrangements allows for more advanced signal processing, such as temporal or spectral compression or magnification. A spectral telescope may for instance allow for conversion of OFDM signals to DWDM-like signals, which can be separated passively, i.e. without additional energy. This is opposed to the DFT OFDM receivers otherwise suggested, where a temporal active gate is required for each tributary. With the spectral telescope, only two active time lenses are required, irrespective of how many tributaries are used. This chapter describes how optical time lenses function and by showing examples of some advanced functionalities points to future scenarios where energy consumption may be considerably reduced.

General information

State: Published
Organisations: Department of Micro- and Nanotechnology, Department of Photonics Engineering, High-Speed Optical Communication, National Space Institute
Authors: Oxenløwe, L. K. (Intern), Galili, M. (Intern), Mulvad, H. C. H. (Intern), Hu, H. (Intern), Guan, P. (Intern), Palushani, E. (Intern), Lillieholm, M. (Intern), Clausen, A. (Intern)
Pages: 261-289
Publication date: 2015

Host publication information

Title of host publication: All-Optical Signal Processing
Volume: 194
Publisher: Springer
Editors: Wabnitz, S., Eggleton, B. J.
ISBN (Print): 978-3-319-14991-2

Series: Springer Series in Optical Sciences
ISSN: 0342-4111
Main Research Area: Technical/natural sciences
Electronic, Optical and Magnetic Materials
DOIs:
10.1007/978-3-319-14992-9_9
Source: FindIt
Source-ID: 2288772289
Publication: Research - peer-review › Book chapter – Annual report year: 2015